

# Research Briefing, 2009



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## **Green Industries & Jobs in California**



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**Centers of Excellence  
Economic and Workforce Development  
California Community Colleges**

The Centers of Excellence, in partnership with business and industry, deliver regional workforce research customized for community college program decision making and resource development.

For additional information, access the complete Preview report,  
available online at:

[www.coeccc.net/green](http://www.coeccc.net/green)



**ECONOMIC &  
WORKFORCE  
DEVELOPMENT**  
through the  
CALIFORNIA  
COMMUNITY  
COLLEGES

## Research Objectives

In 2008, the Centers of Excellence (COE) of the California Community Colleges Economic and Workforce Development Program launched a study of the green economy and green jobs in the state. Given the emerging character of this field of study, the COE decided to first focus on identifying green and clean tech industries, resulting in a comprehensive crosswalk between green clusters, industries, occupations, and existing community college programs.

This Preview of Findings features some of the key ideas and research impacting California's green economy, green career opportunities, and workforce training gaps, as identified by the COE. This document does not list every green job opportunity, rather its purpose is to distinguish and describe a few significant occupations that may warrant special attention from California Community Colleges.

The second phase of the green economy study is scheduled to begin in March 2009 and will focus on surveying employers to collect comprehensive quantitative and qualitative data on green industries and occupations as identified in the crosswalk.

Several information sources were used to produce this Preview, including a number of published and in-progress research scans by the COE, as well as publications from other agencies. As this report uses preliminary data and information, most of which still needs to be verified and validated, findings presented here should be treated as rough approximations or estimates.

## Defining the Green Economy

A common definition of what the green economy entails or what makes a job green does not seem to exist. In numerous reports published on the subject, the definitions can vary widely, primarily due to differences in the purpose and scope of the studies. In setting parameters for the COE research, it was determined necessary to look at emerging, changing, and rapidly growing industries, as well as occupations that are completely new (emerging) and/or require new knowledge, skills and abilities. From this perspective, the following definitions were developed:

- A **Green Firm** is an organization that provides products and/or services that are aimed at utilizing resources more efficiently, providing renewable sources of energy, lowering greenhouse gas emissions, or otherwise minimizing environmental impact.
- A **Green Job** is an occupation that 1) directly works with policies, information, materials, and/or technologies that contribute to minimizing environmental impact, and 2) requires specialized knowledge, skills, training, or experience in these areas.

Under the guidance of these working definitions, the COE identified six major sectors or areas of the green economy. Each represents a value chain of activities (research and development, manufacturing, distribution, installation, maintenance and repair) that are clustered around a similar green technology and/or purpose.



## **Green Occupations**

The most recent data available indicates that the following occupations and/or occupational groups present significant opportunities for community college program development throughout California.<sup>1</sup>

### **Wind Turbine Technicians (Renewable Energy)**

Since 2000, cumulative wind power capacity has grown an average of 27% per year in the United States. Of the 50 states, California is second only to Texas in wind turbine capacity. However, California's wind capacity is estimated to more than double when energy transmission systems upgrades are completed in the next few years.

- During wind farm construction, approximately 40 to 140 jobs are needed per 100 megawatt (MW). With more than 1,300 MW in development, potential growth could range from 520 jobs to as many as 1,820 jobs.
- In operation, 6 to 10 operations and maintenance jobs are needed per 100 MW. Combined, the state's current and in-development capacity totals about 2,440 MW, requiring anywhere from 230 to 380 turbine technicians.
- When transmission upgrades are completed, the demand for turbine technicians could double to as many as 460 to 760 jobs and replacement needs could exceed 250 openings annually.
- The COE are currently partnering with the American Wind Energy Association (AWEA) to survey wind employers on their employment needs. The full report is expected in late May, 2009.

### **Alternative Fuel Automotive Technicians (Transportation and Alternative Fuels)**

From passenger cars to buses and trucks, alternative fuel vehicles continue to be in high demand. Automotive technicians and mechanics will need specialized training in hybrid/electrical, hydrogen/fuel cell, natural gas, and biodiesel vehicles to adapt to these new technologies. According to COE interviews with employers, there will be more demand for alternative fuel bus and truck technicians than passenger vehicle technicians, as transit agencies and trucking companies aggressively transition to greener vehicles.

- The number of jobs for automotive technicians and repairers (all specialties) is expected to increase by 6,500 or 8% by 2013. Bus, truck and diesel engine mechanics (all specialties) are projected to add 2,130 new jobs.
- Automotive technicians and repairers earn a median hourly wage of \$18.55, while bus, trucks and diesel engine mechanics earn an average of \$21.10 hourly. However, industry experts indicate alternative fuel technicians have additional earning potential as they are in high demand.

### **Solar System Installers/Technicians (Renewable Energy)**

According to a [COE solar study](#) conducted in 2008, there were approximately 3,300 solar photovoltaic (PV) system and 1,000 solar thermal system installers/technicians in California.

- Solar industry employers surveyed indicated one-year growth could be as high as 2,400 additional jobs for PV installers and 600 new jobs for solar thermal installers.
- Median average earnings for solar system installers/technicians in 2008 ranged from \$31,200 to \$52,000.
- Related occupations profiled in the survey included solar sales representatives or estimators, solar systems designers or engineers and solar installation managers or foremen.

### **Cost Estimators for Green Building/Retrofitting (Green Building and Energy Efficiency)**

The number of green buildings in California has been experiencing double-digit growth in recent years. More than 25 cities have enacted mandatory Green Building Ordinances, including Los Angeles, San Francisco, and Long Beach.

- Qualified cost estimators are critical for green building projects. They need to know not only the principles of cost estimating for construction but also the principles of green building, green rating systems, and the use of green materials, products and services.
- According to available data, demand for cost estimators (all specialties) is reasonably strong. By 2013, cost estimators are projected to increase by as many as 3,400 new jobs or 13% growth.
- Cost estimators earn a median annual wage of \$61,300 or \$29.45 hourly.

### **More Green Occupations**

Occupational profiles for ethanol and biodiesel production technicians, energy efficiency occupations, and green engineering occupations are included in the full Preview report on the COE website at [www.coeccc.net/green](http://www.coeccc.net/green). The COE is also conducting a statewide energy efficiency study, with initial reports expected in March, 2009.

<sup>1</sup>Although included where possible, quantitative statewide data are not available for all occupations studied. Some information was derived from executive interviews and secondary sources, including California's Labor Market Information Division and Economic Modeling Specialists, Inc. More information is available in the Preview report on the COE website at [www.coeccc.net/green](http://www.coeccc.net/green).

## Education and Training

The graphic below includes examples of the community college response to the demand for a green workforce and details some of the current program offerings associated with the six major sectors or areas of the green economy (as detailed on page 2).

# California Community Colleges

**Renewable Energy: Energy Generation, System Installation and Storage.** Statewide, community colleges offer a range of options incorporating renewable energy curriculum, from non-credit training to certificate programs to Associate degrees. Examples include:  
**Solar-Photovoltaic Installer Certification** — Los Angeles Trade Technical College (LATTC)  
**Energy Technology Certificate (Emphasis on Wind)** — Cerro Coso Community College

**Green Building and Energy Efficiency.** Green building and energy efficiency components are often integrated into the curriculum of existing construction programs. The following programs are known to have green building or energy efficiency components.  
**Construction and Energy Management (AS and certificate)** — Cabrillo Community College  
**Environmental Control Technology (HVAC)** — College of the Sequoias  
**Energy Management and Climate Policy** — De Anza Community College

**Biofuels Production and Farming.** Current programs in biological science, biotechnology, and agricultural technology are the most likely to incorporate the training and education needed for this green industry. Examples include:  
**BioResource and Agricultural Engineering** — Cuesta College  
**Sustainable Agriculture** — Santa Rosa Junior College

**Transportation and Alternative Fuels.** Almost 70 community colleges have existing automotive programs, graduating close to 2,300 students last year. Several of these programs have already adopted alternative fuels curriculum.  
**Automotive Alternative Fuels** — College of the Desert  
**Advanced Transportation Technology (Electric Vehicles)** — Long Beach City College  
**Electric Vehicle Technology** — Sacramento City College

**Water, Wastewater and Waste Management.** Currently, at least 15 colleges offer programs related to water and wastewater technology. Examples include:  
**Water and Wastewater Technology Education** — Palomar College  
**Water Sciences** — Santa Barbara City College  
**Wastewater/Environmental Sanitation** — Santiago Canyon College

**Environmental Compliance and Sustainability Planning.** Curriculum focusing on environmental compliance and sustainability planning is usually included in programs related to environmental technology and industrial/occupational safety and health.  
**Environmental Technology** — Bakersfield College  
**Environmental Technology: Occupational Safety and Health** — El Camino College  
**Environmental Management and Restoration Technology** — Merritt College

## For More Information

For more information on this study, contact the following Center of Excellence (COE) at:

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